

# Subcommittee Process Technical Overview Lighting

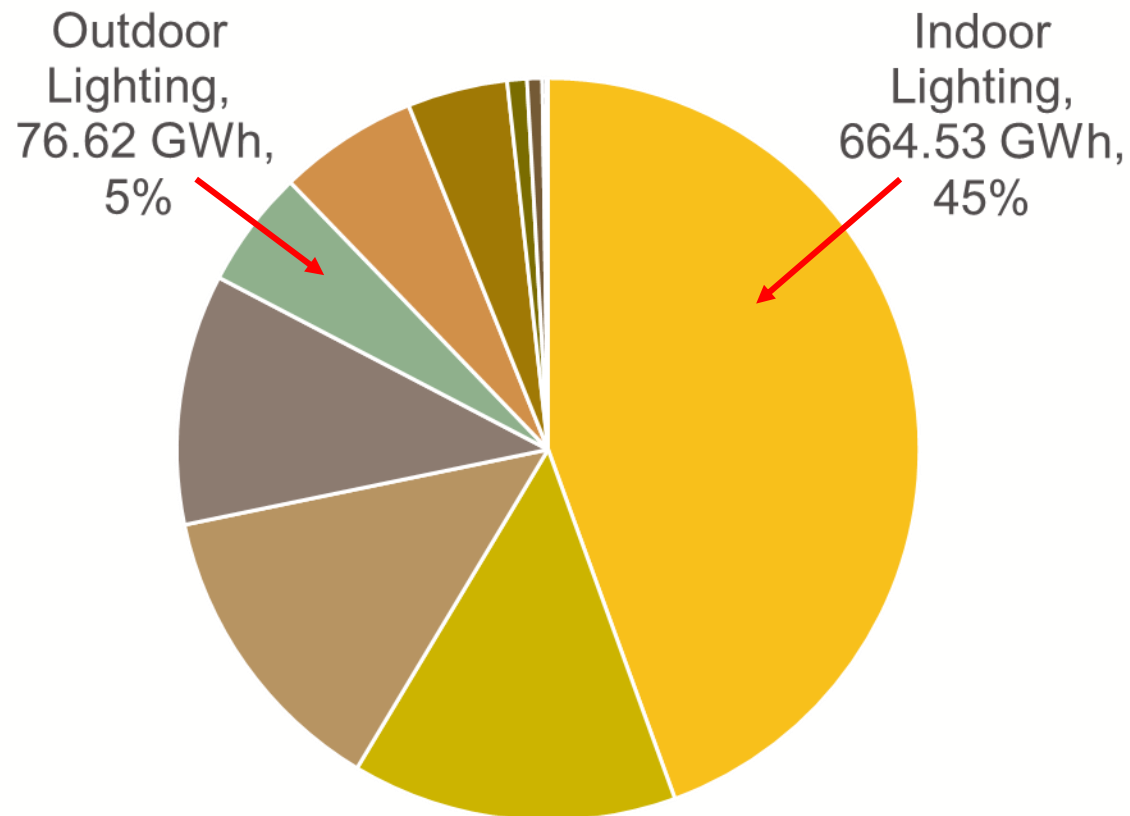


**TIM MELLOCH**  
**JUNE 2017**

# 2016: Lighting Savings Perspective

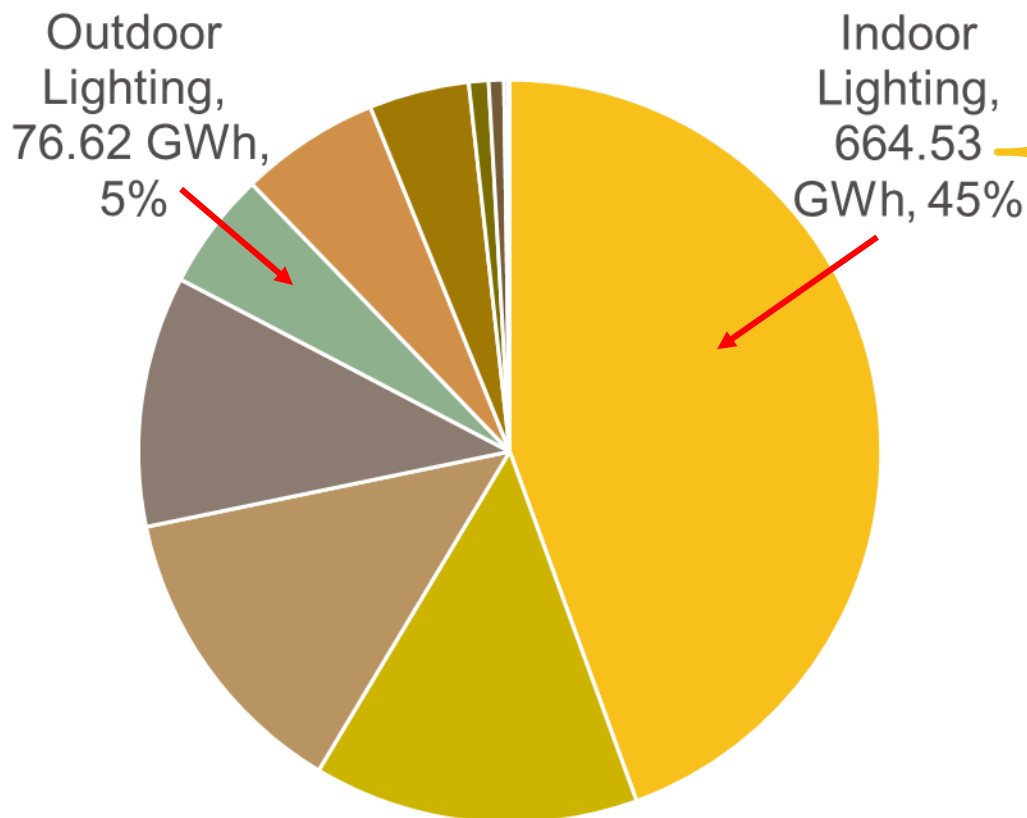
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2016 Q1-Q4 - EESat Data  
Total: 1,494.88 GWh



# Indoor Lighting

2016 - EESat Data  
Total: 1,494.88 GWh



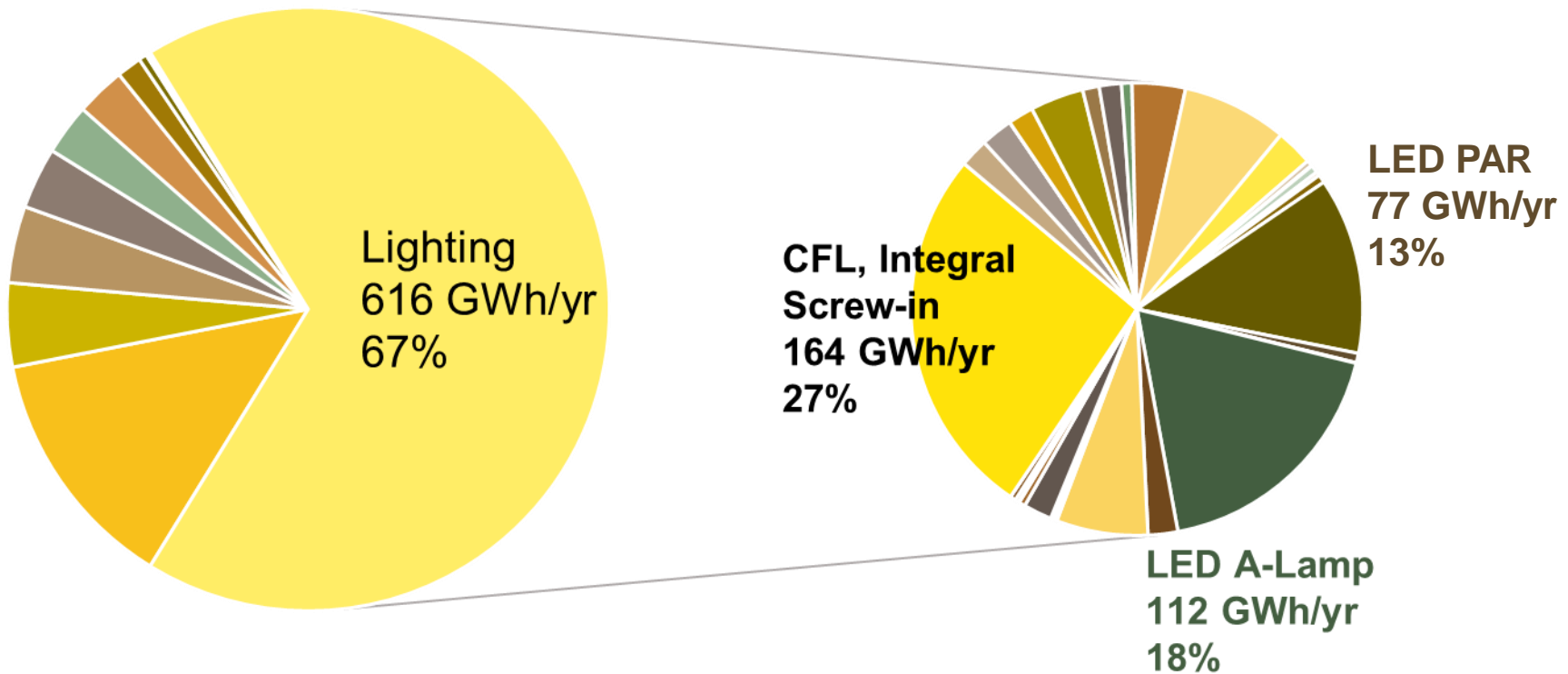
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| Indoor Lighting                          |               |
|--|---------------|
| Lighting Indoor CFL > 30 Watts           | 2.58          |
| Lighting Indoor CFL 3 Way                | 13.54         |
| Lighting Indoor CFL A Lamp               | 31.46         |
| Lighting Indoor CFL Basic                | 138.87        |
| Lighting Indoor CFL Fixture              | 1.76          |
| Lighting Indoor CFL Globe                | 0.00          |
| Lighting Indoor CFL Other                | 0.00          |
| Lighting Indoor CFL Reflector            | 4.65          |
| Lighting Indoor Controls Daylighting     | 0.17          |
| Lighting Indoor Controls Other           | 1.40          |
| Lighting Indoor Controls Wall Or Ceiling | 1.30          |
| Lighting Indoor Fixture Integrated Occu  | 0.17          |
| Lighting Indoor HID                      | 0.18          |
| Lighting Indoor High Bay Fluorescent     | 2.21          |
| Lighting Indoor Induction                | 0.02          |
| Lighting Indoor LED Fixture              | 125.80        |
| Lighting Indoor LED Lamp                 | 123.43        |
| Lighting Indoor LED Night Light          | 0.20          |
| Lighting Indoor LED Other                | 19.97         |
| Lighting Indoor LED Reflector Lamp       | 124.17        |
| Lighting Indoor LED Signage              | 0.13          |
| Lighting Indoor Linear Fluorescent       | 42.10         |
| Lighting Indoor Linear Fluorescent Dela  | 3.96          |
| Lighting Indoor Other                    | 26.09         |
| Lighting Outdoor LED Fixture             | 0.03          |
| Lighting Outdoor LED Streetlight         | 0.28          |
| Other                                    | -             |
| Retrocommissioning Lighting              | 0.06          |
| <b>Indoor Lighting Total</b>             | <b>664.53</b> |

# Lighting Savings Perspective

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2016 CA Deemed Electric Savings  
(Total = 912 GWh/yr)



# 2017 Lighting Measures

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| No.    | Description                      | Energy (kWh/yr) | % of Total |
|--------|----------------------------------|-----------------|------------|
| 4.01   | CFL, Interior Fixture            | 1,639,129       | 0.3%       |
| 4.02   | CFL, Exterior Fixture            | 2,472,772       | 0.4%       |
| 4.03   | CFL, BiLevel Fixture             | 15,128          | 0.0%       |
| 4.04   | CFL, Integral/Screw-in           | 164,363,359     | 26.7%      |
| 4.05   | CFL, Integral/Screw-in, Multiple | 12,639,624      | 2.1%       |
| 4.06   | CFL, 3-Way                       | 14,063,950      | 2.3%       |
| 4.07   | CFL, Spiral                      | 82,874          | 0.0%       |
| 4.08   | CFL, Pin-Based                   |                 |            |
| 4.09   | CFL, Plug-In                     | 3,806           | 0.0%       |
| ★ 4.10 | LF, 4' Replace Lamp              | 11,245,144      | 1.8%       |
| 4.11   | LF, Dimming Ballast              |                 |            |
| 4.12   | LF, Ballast Retrofit             |                 |            |
| 4.13   | LF, Replacement Fixture          | 23,561,653      | 3.8%       |
| 4.14   | LF, HP Fixture                   | 7,312,149       | 1.2%       |
| 4.15   | LF, Delamping Fixture            |                 |            |
| ★ 4.16 | LED, Interior Downlight          | 9,762,830       | 1.6%       |
| 4.17   | LED, Exterior Wallpack           | 4,612,086       | 0.7%       |
| 4.18   | LED, High/Low Bay                | 23,523,635      | 3.8%       |
| 4.19   | LED, Troffer (2x4, 1x4, 2x2)     | 46,380,364      | 7.5%       |
| 4.20   | LED, Street Light                | 16,266,823      | 2.6%       |
| 4.21   | LED, Interior Common, Res        | 2,506,851       | 0.4%       |
| 4.22   | LED, Landscape                   | 270,207         | 0.0%       |
| 4.23   | LED, Exterior with Motion        | 3,422,230       | 0.6%       |
| 4.24   | LED, Exterior, Res               | 1,687,353       | 0.3%       |
| 4.25   | LED, Exterior, Pole              |                 |            |
| ★ 4.26 | LED, MR-16                       | 3,639,850       | 0.6%       |

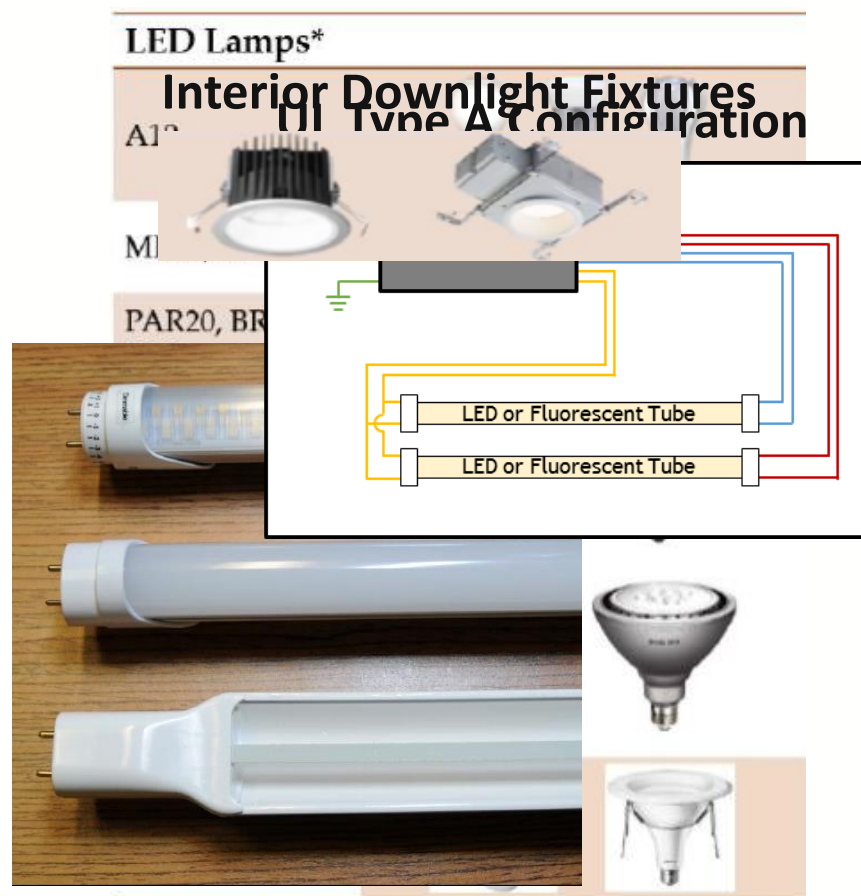
| No.    | Description                    | Energy (kWh/yr) | % of Total |
|--------|--------------------------------|-----------------|------------|
| ★ 4.27 | LED, PAR20, 30, 38,            | 77,757,805      | 12.6%      |
| ★ 4.28 | LED, Candelabra                | 4,150,347       | 0.7%       |
| ★ 4.29 | LED, Globe                     | 236,283         | 0.0%       |
| ★ 4.30 | LED, A-Lamp                    | 112,402,706     | 18.2%      |
| ★ 4.31 | LED, Recessed Downlight        | 13,090,543      | 2.1%       |
| ★ 4.32 | LED, R-BR                      | 40,386,227      | 6.6%       |
| ★ 4.33 | LED, GU-24                     |                 |            |
| 4.34   | LED, Various Lamps             |                 |            |
| 4.35   | LED, Exterior Lamps            | 1,194,663       | 0.2%       |
| ★ 4.36 | LED, Tube LED                  | 423,546         | 0.1%       |
| 4.37   | HID, Interior Fixture          | 22,981          | 0.0%       |
| 4.38   | HID, Exterior Fixture          | 20,173          | 0.0%       |
| 4.39   | HID, Interior Lamp             |                 |            |
| 4.40   | Sensor, Residential Occ        | 57,408          | 0.0%       |
| 4.41   | Sensor, Wall or Ceiling Occ    | 889,086         | 0.1%       |
| 4.42   | Sensor, Integrated Fixture     | 154,002         | 0.0%       |
| 4.43   | Sensor, Photocell              |                 |            |
| 4.44   | Open Sign                      | 130,576         | 0.0%       |
| 4.45   | Menu Board                     |                 |            |
| 4.46   | Channel Letter Sign            |                 |            |
| 4.47   | Refrig, Case Door              | 12,515,846      | 2.0%       |
| 4.48   | Refrig, Walk-in                | 15,982          | 0.0%       |
| 4.49   | Refrig, Reach-in               | 2,732,405       | 0.4%       |
| 4.50   | Cold Cathode                   |                 |            |
| 4.51   | LED, Pool                      |                 |            |
| 4.52   | CFL, Ceiling Fan               |                 |            |
| 4.53   | LED, Sports or Athletic Fields | 398,406         | 0.1%       |

# Lighting Measures for 2017

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## Lighting Measures for 2017

- LF, 4' Replace Lamp
- LED, Interior Downlight
- LED, Tube LED
- LED, A-Lamp
- LED, Candelabra
- LED, MR-16
- LED, PAR20, 30, 38,
- LED, R-BR
- LED, Globe
- LED, GU-24
- LED, Recessed Downlight



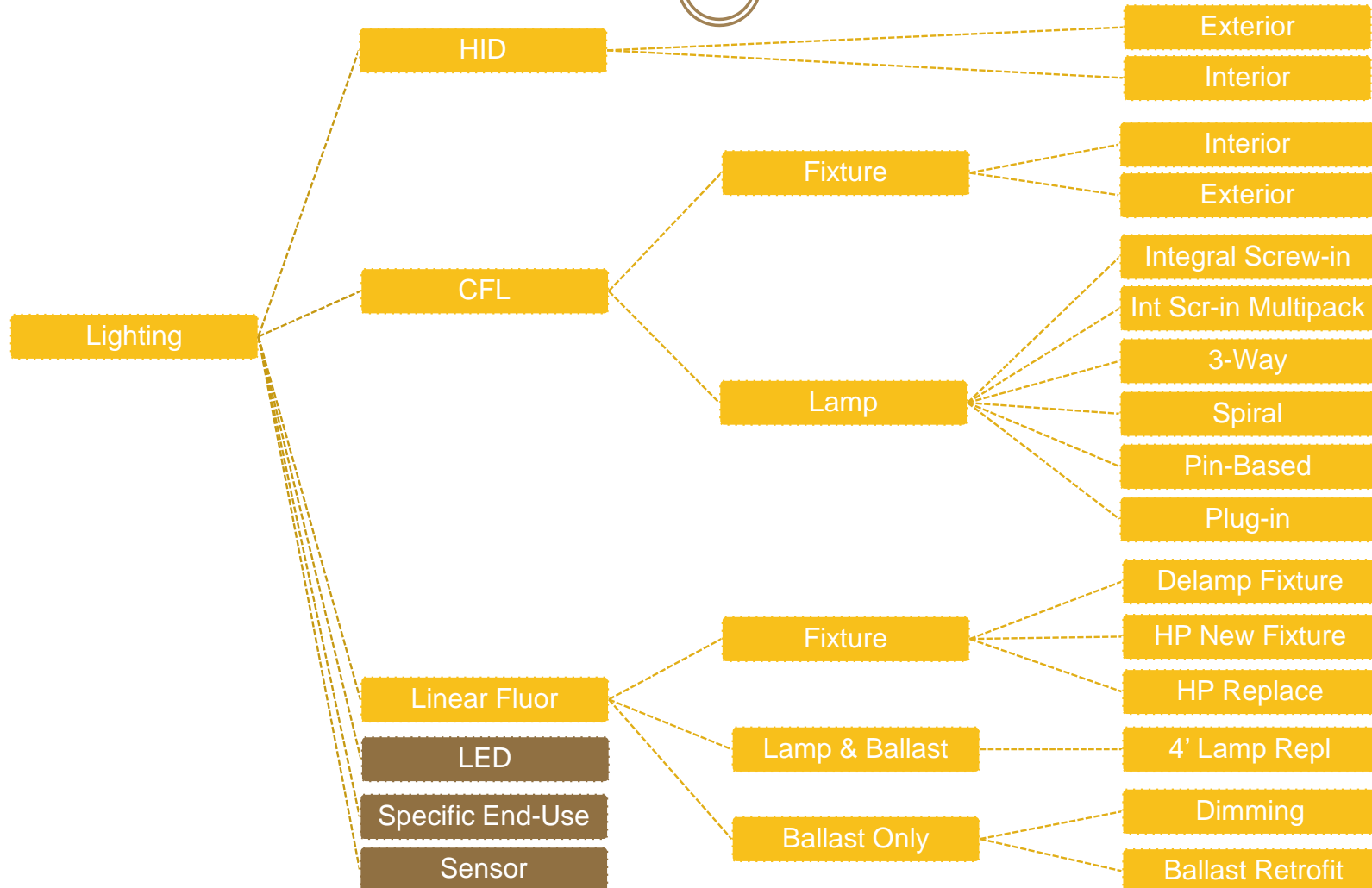
# Lighting – Cross Cutting Issues

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- Savings methodology
  - Wattage Reduction Ratio vs Wattage Range vs Lumen Bins
  - Interactive effects
  - Hours of Use support
  - Baseline
  - Existing Conditions – AB802
- Cost variation due to Climate Zone
- Permutation collapse
- Categorization

# Lighting Measure Tree

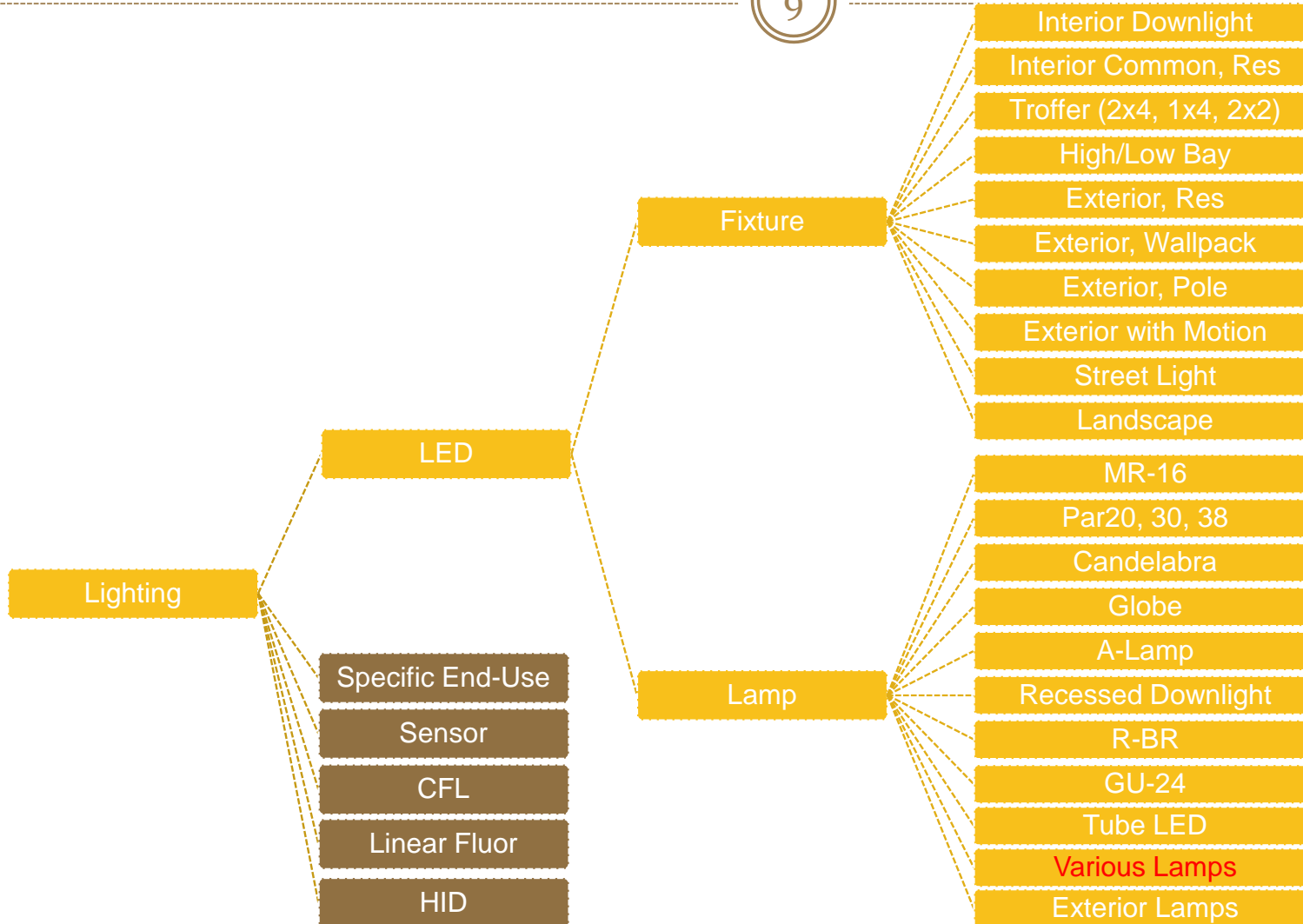
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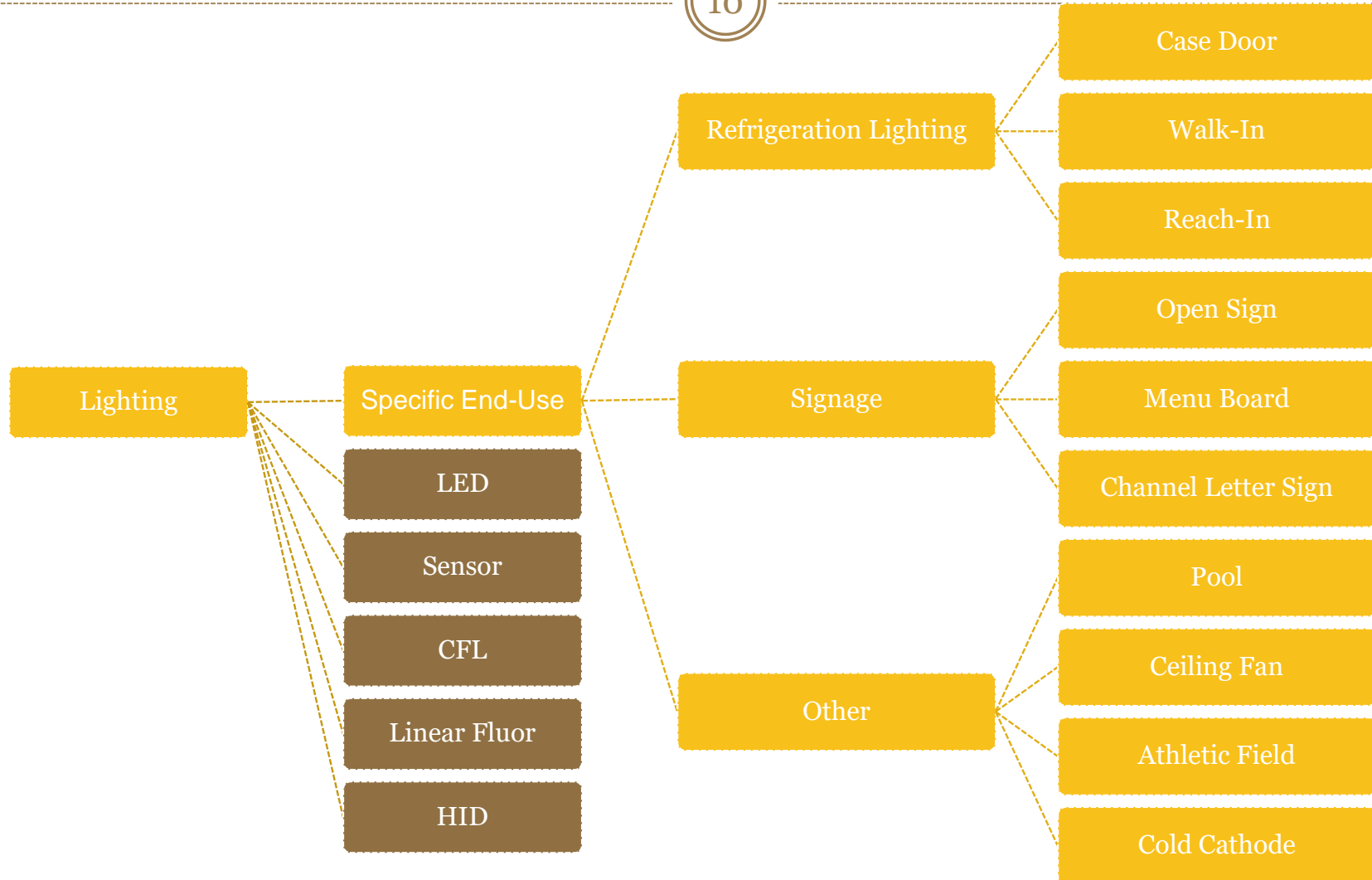
# Lighting Measure Tree

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# Lighting Measure Tree

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# Backup Slides

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